

What is claimed is:

1. An antistatic agent consisting of:

(a) at least one anion represented by one of the following formulae:



(A)



(B)

wherein:

15 each R_f is independently a fluorinated alkyl or aryl group that may be cyclic or acyclic, saturated or unsaturated, and may optionally contain catenated or terminal heteroatoms selected from the group consisting of N, O, and S,

Q is independently an SO_2 or a CO linking group, and

20 X is selected from the group consisting of QR_f , CN, halogen, H, alkyl, aryl, Q-alkyl, and Q-aryl;

where any two contiguous R_f groups may be linked to form a ring; and

(b) at least one cation having at least one polyoxyalkylene moiety bonded to at least one cationic nitrogen center.

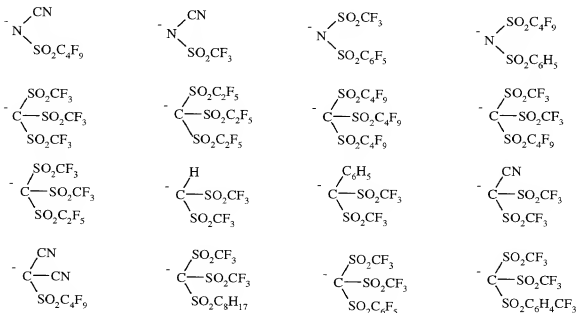
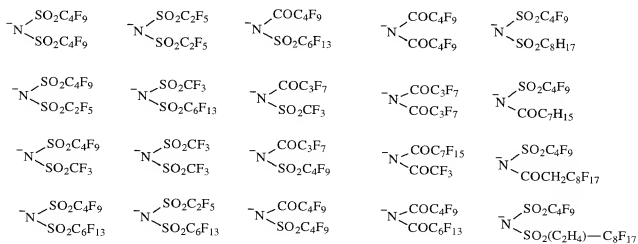
25 2. The antistatic agent according to claim 1, wherein in formula (A), X is QR_f and both Qs are SO_2 linking groups.

30 3. The antistatic agent according to claim 1, wherein the R_f groups are perfluoroalkyl groups.

4. The antistatic agent according to claim 1, wherein formula (A) is a carbonylsulfonyl imide.

5. The antistatic agent according to claim 1, wherein formula (A) is bis(perfluorobutanesulfonyl) imide.

6. The antistatic agent according to claim 1, wherein the anion is selected from the group consisting of:

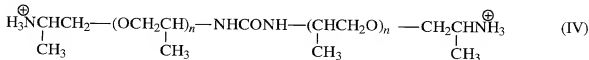
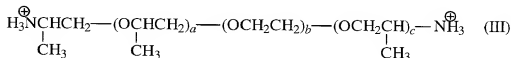
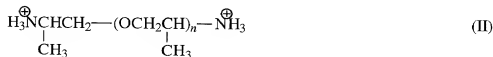
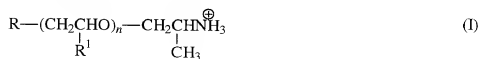


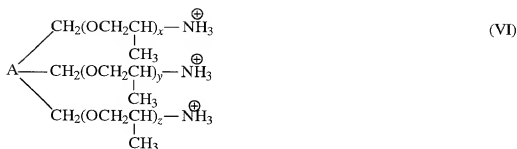
7. The antistatic agent according to claim 1, wherein in formula (B) X is QR_f and all Q's are SO_2 linking groups.

8. The antistatic agent according to claim 1, wherein formula (B) is a tris(perfluoroalkanesulfonyl) methide.

9. The antistatic agent according to claim 1, wherein said cation is a mono-ammonium, di-ammonium, or tri-ammonium compound.

10. The antistatic agent according to claim 1, wherein said cation is selected from the group consisting of:





and



wherein R is an alkoxy group that may be substituted, R¹ is a hydrogen atom or an alkyl group, n is an integer of 3 to 50, b is an integer of 5 to 150, a and c, the same or different, each is an integer from 0 to 5, such that a+c is an

integer from 2 to 5, A is a CH₂=, CH₃C≡, CH₃CH₂C≡, or a $\begin{array}{c} | \\ \text{--CH--CH}_2 \end{array}$ --group, x, y and z, equal or different, are integers of 1 to 30 such that the sum of x + y + z ≥ 5, POA is either a homopolymer or a copolymer that is random, blocked, or alternating, and POA comprises 2 to 50 units represented by the formula ((CH₂)_mCH(R⁴)O) where each unit independently has m and R⁴,

where m is an integer from 1 to 4,

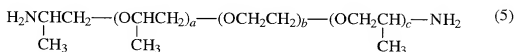
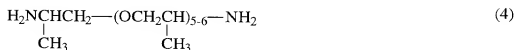
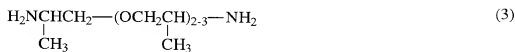
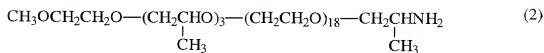
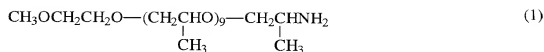
R⁴ is independently hydrogen or a lower alkyl group,

R² is independently an alkyl, an alicyclic, an aryl, an alkalicyclic, an arylalicyclic, or an alicyclicaryl group that optionally contains one or more heteroatoms,

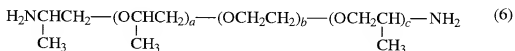
R³ is independently hydrogen, an alkyl, an alicyclic, an aryl, an alkalicyclic, an arylalicyclic, or an alicyclicaryl group that optionally contains one or more heteroatoms, and d is an integer from 1 to 4.

11. The antistatic agent according to claim 10, wherein said R is selected from the group consisting of: methoxy, ethoxy, propoxy, and 2-methoxy-ethoxy.

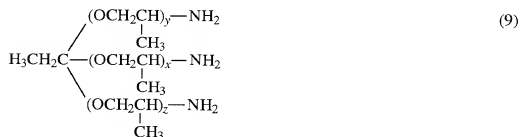
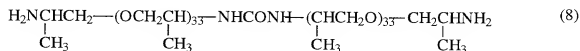
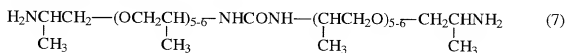
12. The antistatic agent according to claim 1, wherein said cation is derived from an amine selected from the group consisting of:



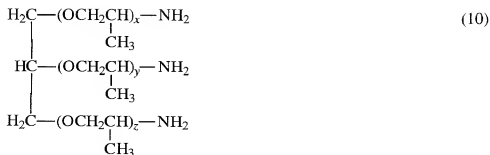
wherein b is ~ 8.5 and $a + c$ is ~ 2.5



wherein b is ~ 15.5 and $a + c$ is ~ 2.5

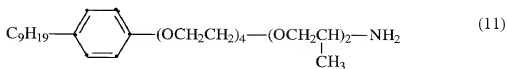


wherein $x + y + z \sim 5-6$

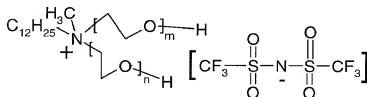
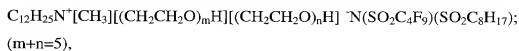
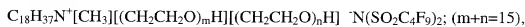
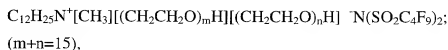


wherein $x + y + z \sim 30$

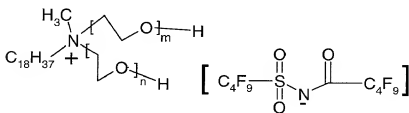
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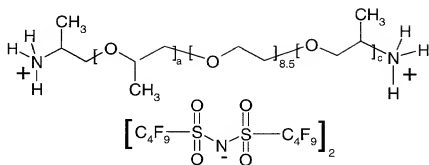
13. The antistatic agent according to claim 1, wherein said antistatic agent is selected from the group consisting of:



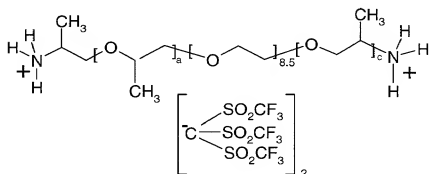
where m+n=15



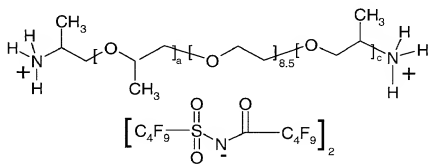
where $m+n=15$



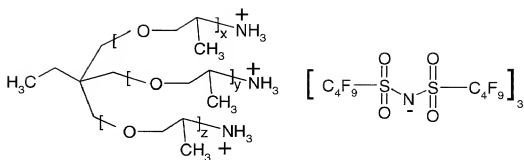
where $a+c \sim 2.5$



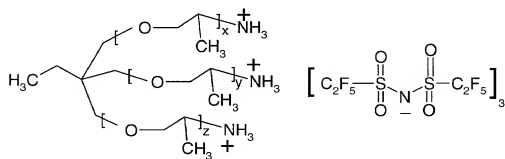
where $a+c \sim 2.5$



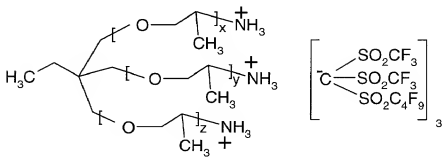
where $a+c \sim 2.5$



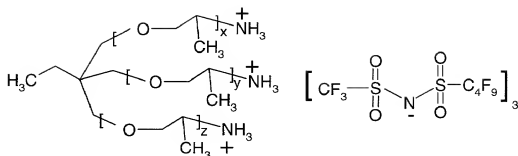
where $x+y+z \sim 5-6$



where $x+y+z \sim 5-6$



where $x+y+z \sim 5-6$, and



where $x+y+z=5-6$.

14. An article comprising an insulating material and the antistatic agent according to claim 1.

15. The article of claim 14, wherein said article is photographic film, x-ray film, x-ray screen, fabric, fiber, electronic component, electronic packaging, compact disc, molded object, or blown object.

16. An article comprising an insulating material coated with an antistatic agent consisting of:

(a) at least one anion represented by one of the following formulae:



(A)



(B)

wherein:

each R_f is independently a fluorinated alkyl or aryl group that may be cyclic or acyclic, saturated or unsaturated, and may optionally contain catenated or terminal heteroatoms selected from the group consisting of N, O, and S,

Q is independently an SO₂ or a CO linking group, and

X is selected from the group consisting of QR_f, CN, halogen, H, alkyl, aryl, Q-alkyl, and Q-aryl;

where any two contiguous R_f groups may be linked to form a ring; and

(b) at least one cation having at least one polyoxyalkylene moiety bonded to at least one cationic nitrogen center.

17. The article of claim 16, wherein said article is a photographic film, x-ray film, x-ray screen, fabric, fiber, electronic component, electronic packaging, compact disc, molded object, or blown object.

18. The article of claim 16, wherein said insulating material comprises a material that is synthetic.

19. The article of claim 18, wherein said synthetic material is selected from the group consisting of poly(vinyl chloride), polyethylenes (high density, low density, very low density), polypropylene, polybutylene, polystyrene, polyesters, polyamides, polycarbonates, polyoxymethylenes, polyacrylates and polymethacrylates, modified polystyrenes, high-impact polystyrenes, fluoroplastics, poly(phenylene oxide)-polystyrene and polycarbonate-ABS, liquid crystalline polymers (LCPs), polyetherketone (PEK), polysulfones, polyimides, polyetherimides, alkyd resins, phenolic resins, amino resins, epoxy resins, unsaturated polyesters, polyurethanes, allylics, fluoroelastomers, and polyacrylates.

20. The article of claim 16, wherein said insulating material comprises a material that is naturally occurring.

21. The article of claim 20, wherein said naturally occurring material is silk, wool, leather, cellulosic, or proteinaceous.

22. A light sensitive photographic material comprising:

(a) an antistatic agent consisting of:

(i) at least one anion represented by one of the following

5 formulae:



(A)



(B)

wherein:

each R_f is independently a fluorinated alkyl or aryl group that may be cyclic or acyclic, saturated or unsaturated, and may optionally contain catenated or terminal heteroatoms selected from the group consisting of N, O, and S,

Q is independently an SO_2 or a CO linking group, and

X is selected from the group consisting of QR_f , CN, halogen, H, alkyl, aryl, Q-alkyl, and Q-aryl;

where any two contiguous R_f groups may be linked to form a ring; and

(ii) at least one cation having at least one polyoxyalkylene

moiety bonded to at least one cationic nitrogen center.

(b) an insulating material;

(c) a silver halide emulsion dispersed in a hydrophilic colloidal binder;

and

(d) optionally at least one protective layer for said emulsion.

23. An antistatic composition comprising

- (a) at least one antistatic agent consisting of
- (i) at least one anion represented by one of the following formulae:



(A)



(B)

wherein:

each R_f is independently a fluorinated alkyl or aryl group that may be cyclic or acyclic, saturated or unsaturated, and may optionally contain catenated or terminal heteroatoms selected from the group consisting of N, O, and S,

Q is independently an SO_2 or a CO linking group, and

X is selected from the group consisting of QR_f , CN, halogen, H, alkyl, aryl, Q-alkyl, and Q-aryl;

where any two contiguous R_f groups may be linked to form a ring; and

- (ii) at least one cation having at least one polyoxyalkylene moiety bonded to at least one cationic nitrogen center; and
- (b) at least one insulating material.

24. The antistatic composition according to claim 23, wherein said composition is prepared by forming a blend of components (a) and (b).

25. The antistatic composition according to claim 24, wherein said blend is a melt blend.

26. The antistatic composition according to claim 23, wherein said insulating materials is selected from the group consisting of thermoplastic polymers and thermoset polymers.

27. The antistatic composition according to claim 26, wherein said insulating material is a thermoplastic polymer.

28. A fiber comprising the antistatic agent of claim 1.

29. A fabric comprising the antistatic agent of claim 1.

30. A film comprising the antistatic agent of claim 1.

31. A molded or blown object comprising the antistatic agent of claim 1.

32. A coating comprising the antistatic agent of claim 1.

33. A process for preparing an antistatic composition comprising the steps of :

(a) combining

(i) at least one antistatic agent consisting of

(I) at least one anion represented by one of the following formulae:



(A)



(B)

wherein:

each R_f is independently a fluorinated alkyl or aryl group that may be cyclic or acyclic, saturated or unsaturated, and may optionally contain catenated or terminal heteroatoms selected from the group consisting of N, O, and S,

Q is independently an SO_2 or a CO linking group, and

X is selected from the group consisting of QR_f , CN, halogen, H, alkyl, aryl, Q-alkyl, and Q-aryl;

where any two contiguous R_f groups may be linked to form a ring; and

(II) at least one cation having at least one polyoxyalkylene moiety bonded to at least one cationic nitrogen center; and

(ii) at least one insulating material; and

(b) melt processing the resulting combination.

34. A process for preparing an antistatic composition comprising the steps of

(a) combining

(i) at least one antistatic agent consisting of

(I) at least one anion represented by one of the following formulae:



(A)



(B)

wherein:

each R_f is independently a fluorinated alkyl or aryl group that may be cyclic or acyclic, saturated or unsaturated, and may optionally contain catenated or terminal heteroatoms selected from the group consisting of N, O, and S,

Q is independently an SO_2 or a CO linking group, and

X is selected from the group consisting of QR_f , CN, halogen, H, alkyl, aryl, Q-alkyl, and Q-aryl;

where any two contiguous R_f groups may be linked to form a ring; and

(II) at least one cation having at least one polyoxyalkylene moiety bonded to at least one cationic nitrogen center;

(ii) at least one insulating material, and

(iii) at least one thermosetting polymer, ceramer, or the reactive precursors of said polymer or ceramer; and

(b) allowing the resulting combination to cure.

35. A process for preparing an antistatic composition comprising the step of applying a topical treatment composition to at least a portion of at least one surface of at least one insulating material, said topical treatment composition comprising at least one antistatic agent consisting of

(a) at least one anion represented by one of the following formulae:



(A)



(B)

wherein:

each R_f is independently a fluorinated alkyl or aryl group that may be cyclic or acyclic, saturated or unsaturated, and may optionally contain catenated or terminal heteroatoms selected from the group consisting of N, O, and S,

Q is independently an SO_2 or a CO linking group, and

5 X is selected from the group consisting of QR_f , CN, halogen, H, alkyl, aryl, Q-alkyl, and Q-aryl;

where any two contiguous R_f groups may be linked to form a ring; and

(b) at least one cation having at least one polyoxyalkylene moiety bonded to at least one cationic nitrogen center.

10 36. A process for preparing an antistatic composition comprising the steps of

(a) dissolving

(i) at least one antistatic agent of claim 1, and

(ii) at least one insulating material in at least one solvent;

(b) casting or coating the resulting solution on at least one substrate;

15 and

(c) allowing evaporation of said solvent.

20 37. A process for preparing an antistatic composition comprising the steps of

(a) combining

(i) at least one antistatic agent of claim 1, and

(ii) at least one monomer; and

(b) allowing polymerization of the monomer to occur.